Water Canaries

Study Units

Unit 2: Aquatic Life; Unit 3: The World in a Pond; Unit 4: People, Land, and Water

Supplemental Information

This is an excellent activity to make students aware of the importance of diversity in an ecosystem. It also relates what the presence (or absence) of certain animals indicates about the "health" of the ecosystem.

In Iowa, factors discussed in the guide are important in determining water quality, but turbidity (a measure of the clarity of the water) is of even greater significance. The major pollutant in Iowa's aquatic resources is soil from surrounding land (watersheds). Nutrients from watersheds in the form of agricultural fertilizers and wastes are also a major contributing factor to decline in water quality. These pollutants create a harsher environment where certain animals cannot live, thus decreasing the diversity of the ecosystem.

Studies have shown that silt (fine soil) kills aquatic insects (e.g., caddisflies, stoneflies, mayflies, dragonflies, damselflies) by clogging the gills of immature stages. Fish that eat these insects (e.g., darters, some minnows, logperch, smallmouth bass) also are affected because their food supply is removed.

Fish that scatter their eggs on the bottom substrate have declined in numbers in many waters because eggs often are suffocated by silt. Predators that feed by sight can't do so in very turbid waters. Again, this affects fish such as darters, some minnows, and black bass. Some suckers and the northern rock bass also are affected. They are replaced by fish (e.g., common carp, white sucker, river carpsucker) that are better able to survive in "dirty" waters.

Excess nutrients degrade water quality by causing "blooms." Algae and aquatic plants grow and reproduce very rapidly when nutrients are added, but they then die and rot. Decomposing bacteria use up oxygen in the water and produce gases such as methane and hydrogen sulfide. More sensitive animals cannot live under these conditions. See the narrative of *Unit 4* for more information about human impacts on Iowa waters.

Teaching Suggestions

Stress the importance of silt as a pollutant in Iowa's waters. If you are doing this activity at a water site, note the clarity/color and odor of the water. Do they indicate siltation or the presence of excess nutrients? The tests mentioned in the guide also may be done using water from a classroom aquarium. (Do not try to collect water samples and bring them into the classroom because temperature, dissolved oxygen, and pH may change drastically in a container.)

Students may use the modified *Information Sheet* to record observations. It emphasizes collecting "detailed" information, which is very important in science. pH paper and Hach kits can be obtained from a scientific supplier or high school biology teacher. Hach kits come with directions designed for **student use**. Use the *Guide to Common Freshwater Animals* for general identification. At least **some** field guides should be available to students for reference.

Get students involved! The DNR's "Adopt-a-Program," IOWATER, and the Izaak Walton League's "Save Our Streams" programs are designed to involve local groups in positive conservation actions. See the "Additional Materials" section for more information.

Evaluation

See the *Water Canaries: Student Worksheet Level 3* and the guide.

Student Materials

Student Worksheet Level 3; Information Sheet; Guide to Common Freshwater Animals.

Answers for Student Worksheet: 1-D, 2-J, 3-I, 4-F, 5-H, 6-A, 7-B, 8-E, 9-C, 10-G

Teacher Aids

CD: Biodiversity of Iowa: Aquatic Habitats

Additional Materials

Adopt-A-Program. (available from: Parks Bureau, IA DNR Wallace State Office Building, 502 East 9th Street, Des Moines, IA 50319; 515/281-8675)

Adopt an Acre - Wetlands For Iowa. (available from: Iowa Natural Heritage Foundation, Insurance Exchange Building, 505 Fifth Ave., Suite 1005, Des Moines, IA 50309)

Investigating Your Environment: Teaching Materials For Environmental Education. (available from: U.S. Forest Service; www.fs.fed.us/outdoors/nrce/iye/basic/chwater.pdf)

IOWATER Volunteer Water Monitoring Program. (available from: IDNR, Wallace State Office Building, 502 East 9th Street, Des Moines, IA 50319-0034; 515/281-3152; www.iowater.net)

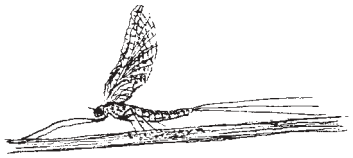
Murdoch, T. and M. Cheo. 1996. The Streamkeeper's Field Guide: Watershed Inventory and Stream Monitoring Methods. Everett, WA: Adopt a Stream Foundation (206/316-8592).

Reid, G.K. 1987. Golden Guide to Pond Life. New York: Golden Press.

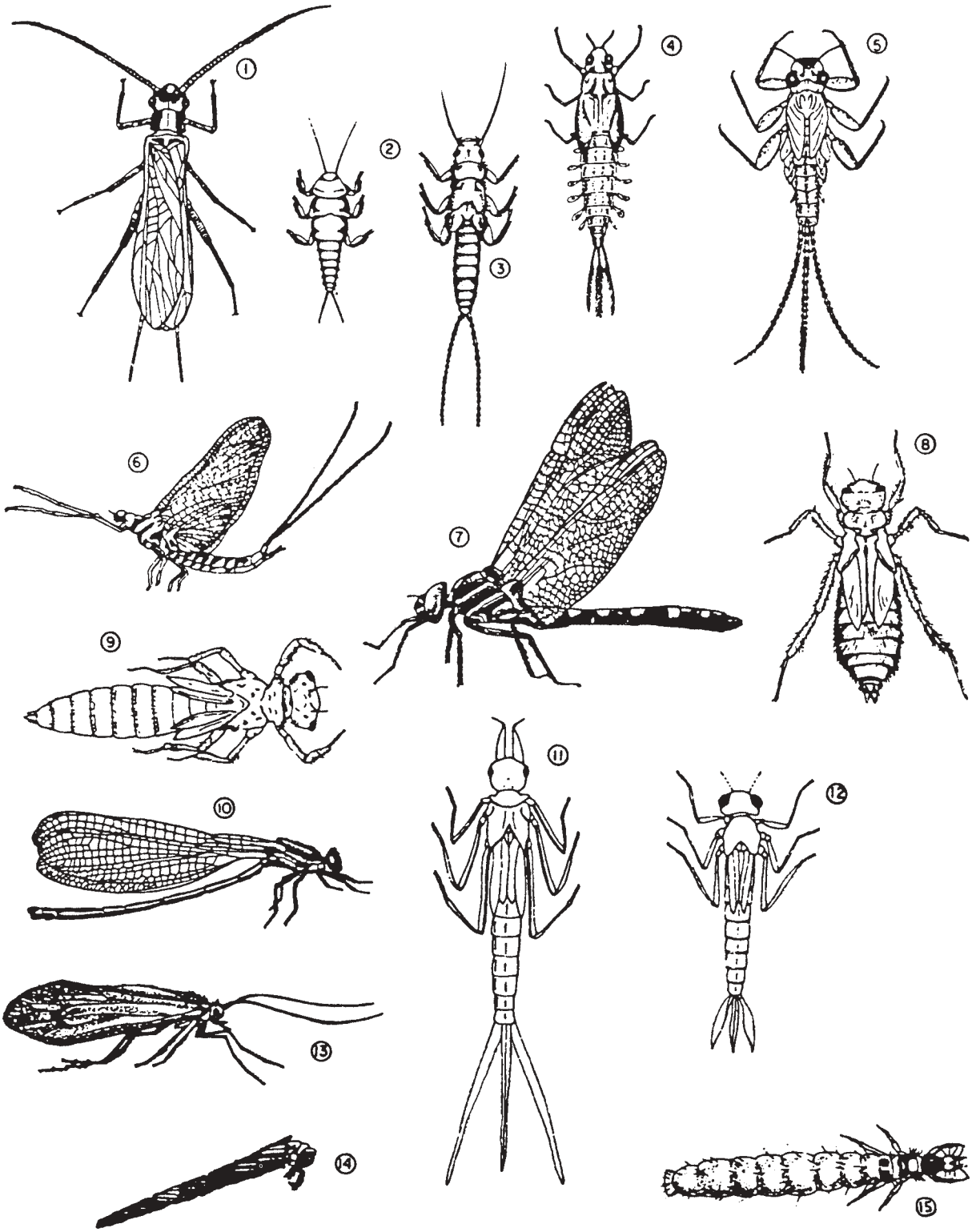
Save Our Streams Action Packet (available from: Izaak Walton League of America, Inc., 707 Conservation Lane, Gaithersburg, MD 20878; 1-800-BUG IWLA)

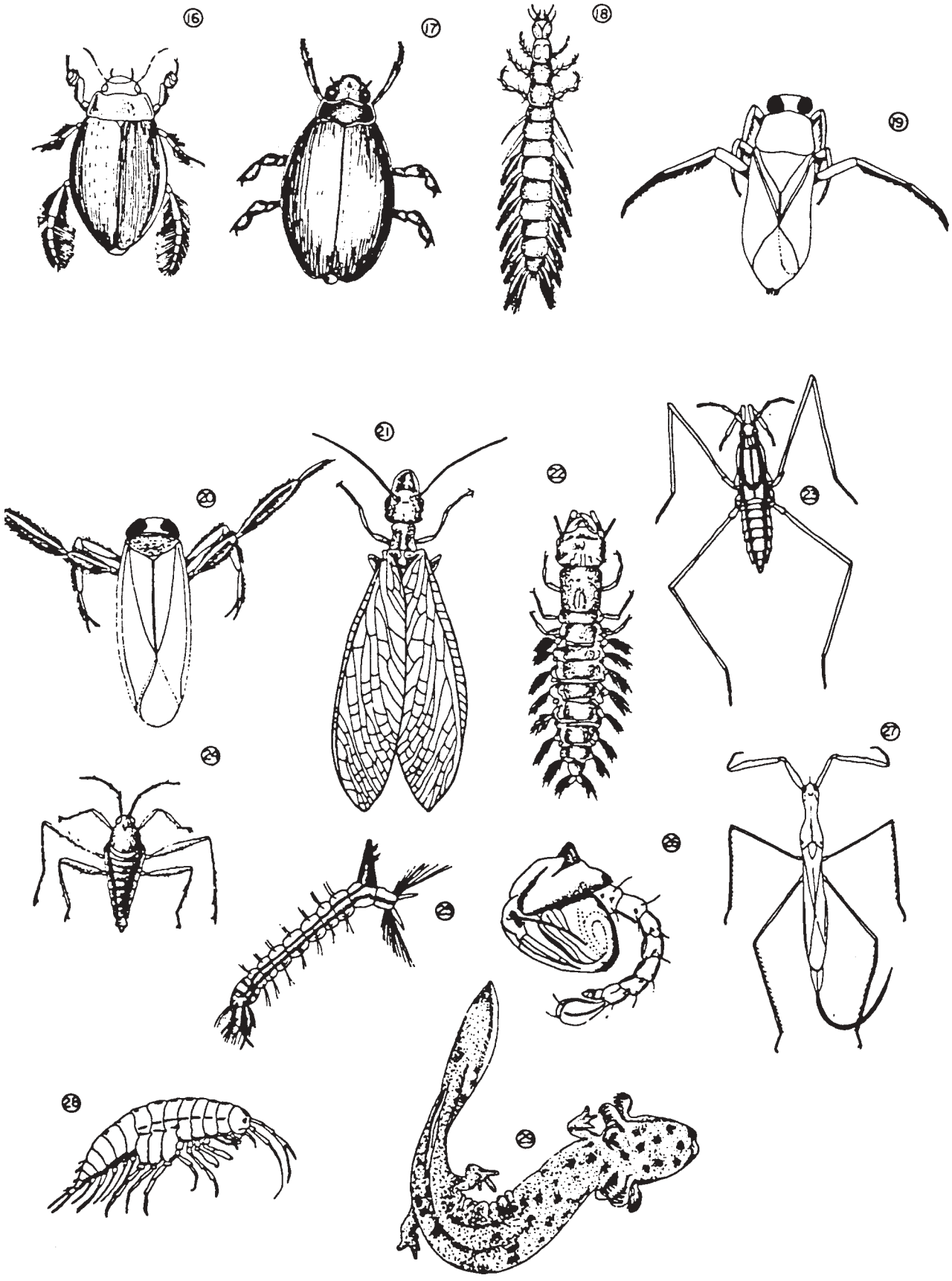
Taking Action: An Educator's Guide to Involving Students in Environmental Action Projects (available from: Project WILD, Iowa Department of Natural Resources, 2473 160th Road, Guthrie Center, IA 50115)

Wetlands Watch (available from: Izaak Walton League of America, Inc., 707 Conservation Lane, Gaithersburg, MD 20878; 1-800-BUG IWLA)



Guide to Common Freshwater Animals

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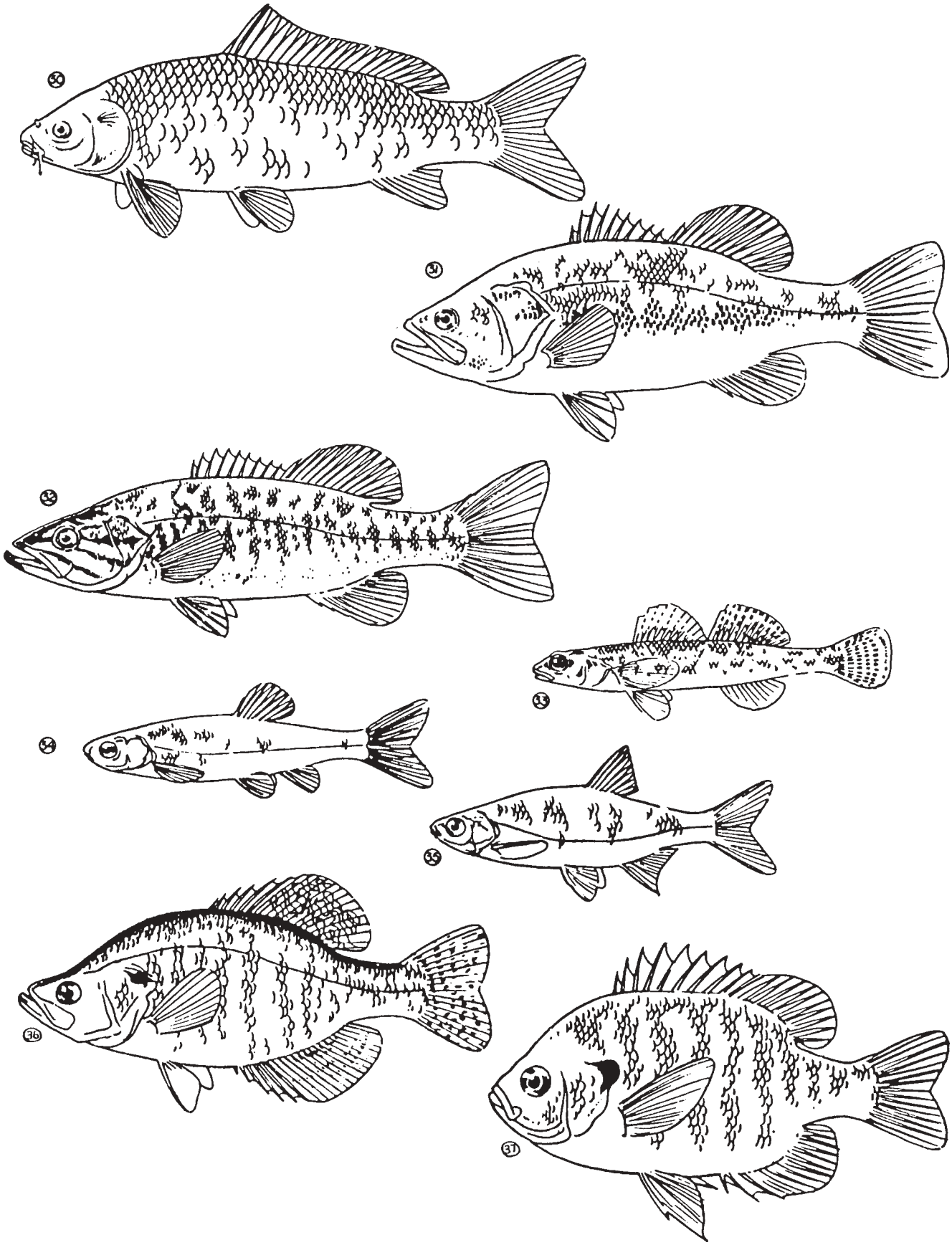
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KEY to “Guide to Common Freshwater Animals”

1. stonefly
2. stonefly nymph
3. stonefly nymph
4. mayfly nymph
5. mayfly nymph
6. mayfly
7. dragonfly
8. dragonfly nymph
9. dragonfly nymph
10. damselfly
11. damselfly nymph
12. damselfly nymph
13. caddisfly
14. caddisfly larva case
15. caddisfly larva
16. whirligig beetle
17. predaceous diving beetle
18. predaceous diving beetle larva
19. backswimmer
20. water boatman
21. dobsonfly
22. hellgrammite (dobsonfly larva)
23. water strider
24. water strider
25. mosquito larva
26. mosquito pupa
27. water scorpion
28. scud (sideswimmer)
29. salamander (axolotl stage)
30. carp
31. largemouth bass
32. smallmouth bass
33. Johny darter
34. fathead minnow
35. golden shiner
36. white crappie
37. bluegill

Illustrations 1 - 29 courtesy Pennsylvania Dept. of Environmental Resources
Illustrations 30 - 37 courtesy Illinois Dept. of Natural Resources

Water Canaries: Information Sheet

(Modified from worksheets from the *WILD Aquatic* guide)

name(s) of collector(s): _____

date: _____

location: _____

air temperature: _____ ^{O}F

water temperature: _____ ^{O}F

pH (acidic or basic): _____

dissolved oxygen: _____

color/odor of water: _____

_____

weather: _____

_____

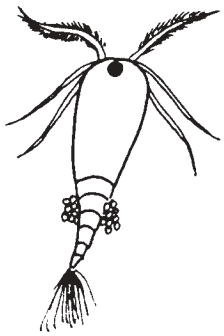
animal #	where animal was found	description	number found	animal name

Water Canaries: Student Worksheet Level 3

Directions: Below are several aquatic animals that are indicators of water quality. Place the letter by the animal in the space next to its name.

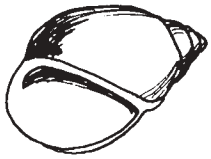
_____ 1. caddisfly	_____ 2. carp	_____ 3. largemouth bass
_____ 4. leech	_____ 5. mayfly nymph	_____ 6. cyclops
_____ 7. water flea	_____ 8. water sowbug	_____ 9. snail
_____ 10. stonefly nymph		

A.



B.

C.



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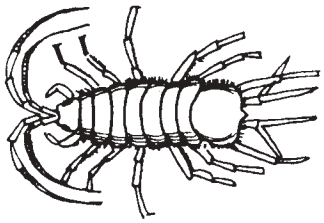

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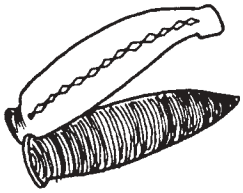

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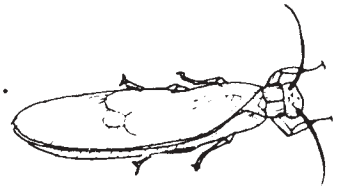

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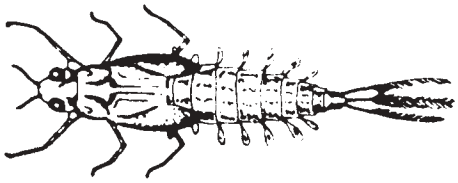
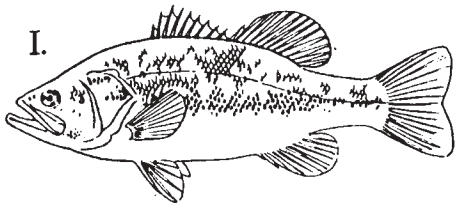


I.



J.